Energy Conversion

Activity 7: Leaf Relay

Activity 8: Energy Conversions

Activity 7 **LEAF RELAY**

CONCEPT Energy moves through food chains.

GOAL Students will learn how energy is "lost" when transferred from one system to another.

MATERIALS Items listed in bold type must be supplied by the teacher. Enough **dry leaves or popcorn** for each group of five to have an armful, handful. (You can also use handfuls of sand, beans or Styrofoam® packing peanuts, or anything else you can find in quantity,) **an open, fairly flat area.**

ACTIVITY

INVITE

1. Introduce students to a simple food chain by putting an example on the chalkboard. Example: sun-grass-sheep; explain that the sun provides energy for grass to grow and the grass provides energy [food] for sheep. OR, sun --> plants --> herbivores --> carnivores --> humans (unless vegetarian!)

DISCOVER/INTRODUCE NEW CONCEPTS

2. Discuss the following points:

- # the sun gives off energy that is used by plants
- # however, the plants don't use all the energy the sun produces (only 2% is used by plants)
- # animals eat plants to get their energy
- # however, not all of the energy that was captured by the plant is still in the plant since it had to use some for its own growth and reproduction
- # with each transfer of energy, some is "lost" to the process of staying alive

It takes energy to get energy!

CREATE (a food chain) AND APPLY NEW KNOWLEDGE

3. Place the pile of leaves at one end of the site in a pile. Form teams of five students.

4. Have each team line up in a parallel line, with 2 to 3 feet separating each person, and several yards separating each group. The teams should be lined up about 100 yards away from the "energy pile." Having groups in a large circle surrounding the "pile" of energy allows everyone to see what is happening, but it has to be big!

5. Assign one of the following roles to each student: The first person in line will be the sun; the second, a plant; the third, a herbivore; fourth, a carnivore; and fifth, a human.

6. Have each player, except the sun, mark their spots. Have the suns stand behind the "energy pile" facing their group.

7. Explain that the sun provides the energy needed in each of the food chains. Have the suns scoop up as many leaves as they can hold in their arms.

8. At the "go" signal, the suns race to the plants who (gently) grab as much of the suns' energy as they can.

9. The plants pivot (they do not run), and the herbivores race up to grab as much energy as they can hold. The herbivores return to their spot. As soon as the herbivores return to their spot, the carnivores run up

and capture the energy from the herbivores. Continue with the humans. When the humans return to their spot, have them raise the remaining energy above their heads to signal that they are through.

GENERATE IDEAS FOR FURTHER INVESTIGATIONS

10. Look on the ground. What happened to the energy during transport and transfer? Compare the amount held by the first and last person. If there were fewer transfers, how much energy would the last person have? How could we make fewer transfers in obtaining energy in our lives? Take out the carnivore stage and compare the amount of energy left over.

11. Introduce environmental disasters like pesticides, floods, or oil spills at one stage. Have the students immediately drop half the leaves they are carrying. This represents the damage and the lessened energy taken up or transferred. Discuss the effects of having less energy for the food chain and survival problems.

Activity 8 **ENERGY CONVERSIONS**

CONCEPT Energy cannot be created or destroyed. It can only change forms.

GOAL Students will use sensory experiences to create an energy conversion grid.

MATERIALS Items listed in bold type must be supplied by the teacher. Solar cell, radiometer, light bulb, battery, electric motor, **Wintergreen Lifesavers™**.

ACTIVITY

INVITE

1. Begin by asking students to name some examples of energy forms. Remind them about MRS CHEN: mechanical, radiant, sound, chemical, heat, electrical, and nuclear.

2. Explain that energy is useful to people when we can "turn it into" some other kind of energy. For example, electricity is useful when we can use it to light a bulb. Food energy, like a candy bar, is useful when we eat it and let our stomach digest it so we can move.

BRAINSTORM IDEAS, PRACTICE TECHNIQUES

3. Hand out "Energy Changes" worksheet.

4. Point out that the worksheet has three of the energy forms that were just talked about. Tell them that you are going to demonstrate some ways that energy changes into a different kind of energy. Students are to figure out into which box the demonstration belongs. The chart, when completed, will look something like the one below:

LIGHT	ELECTRICITY	MOTION
	SOLAR CELL	RADIOMETER; PUPILS DILATING WHEN LIGHTS ARE TURNED ON; PLANTS MOVING WITH THE SUN (CALLED PHOTOTROPISM)
LIGHT BULB		ELECTRIC MOTOR HOOKED TO BATTERY
LIFE SAVERS	STATIC (SPARKS)	

APPLY NEW KNOWLEDGE

5. Go in any order using the following steps as guidelines:

SOLAR CELL: Explain that the sunlight strikes the solar panel which creates electricity.

BULB: Electricity flows to the filaments in the bulb causing them to glow.

ELECTRIC MOTOR: When hooked to a battery, the electricity causes the shaft to spin.

LIFESAVERS SPARKS: Give each student a lifesaver. Turn out the lights. The darker

the room the better. As students crunch down on the lifesaver (motion), it makes a spark, (light).

STATIC ELECTRICITY: If your room has a rug, you can demonstrate this more easily. Have a student take off his/her shoes and scoot his/her feet across the rug. Have him/her touch a metal object like a desk or pencil sharpener to illustrate static charge.

RADIOMETER: When light strikes the wings of the radiometer, it transfers heat to each one--but not to the same degree. The lighter wing reflects the rays, and the dark wing absorbs the rays. When freely moving particles of air inside the radiometer strike the light colored wings, they take on very little energy and do not bounce off very fast. (Remind students that black t-shirts on a hot day are warmer than a white t-shirt. The hotter something is, the more the particles that make up the object move around.) But, when particles strike the dark wings, they take on a great deal of energy and "kick" away at terrific speed. The result is the movement of the wings in a circle from black to white.

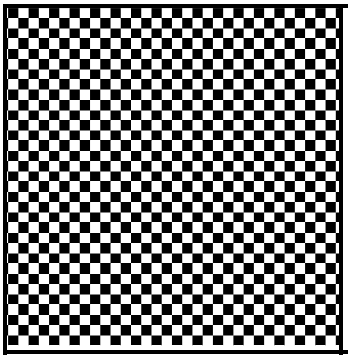
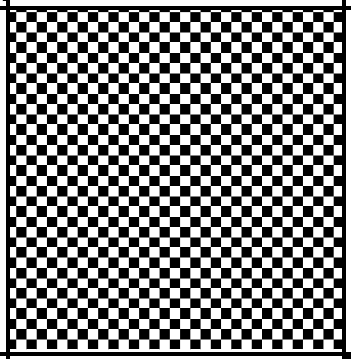
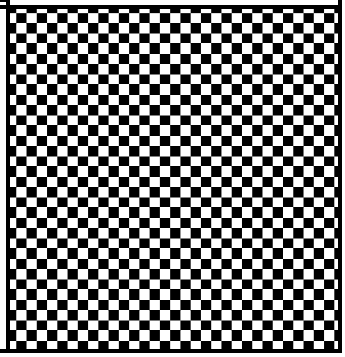
PHOTOTROPISM: Plants move throughout the day to receive light energy. Observe a flowering plant in the morning as it sits in a windowsill. Observe it again in the afternoon and notice how the plant has changed position relative to the sun. Another example is to turn out the lights in the classroom. Have students form pairs and ask them to look at the pupils of the eyes of their partner. Let the room remain dark for 2 or 3 minutes. Then, count to 3 and turn the lights on. Students should see a shrinking of the pupil in their partner's eyes. This is a more abstract example of light energy creating motion (in the eye).

GENERATE IDEAS FOR FURTHER INVESTIGATION

6. Challenge students to come up with ideas of their own using the second table on their worksheet.

NAME_____

ENERGY CHANGES

LIGHT	ELECTRICITY	MOTION
		
		
		

HERE ARE SOME OF MY OWN ENERGY CHANGES. . .